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DRAWINGS ATTACHED

1 329 205

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(72) Inventor ANTHONY WALTER DAVEY

(54) IMPROVEMENTS IN LINEAR INDUCTION MOTORS

(71) We, HERBERT MORRIS LIMITED, of Loughborough, County of Leicester, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in linear induction motors.

The object of the invention is to improve economically the performance of a given size and weight of linear motor.

It is well known that the output from a linear motor depends on the maximum temperature rise of the windings that can be tolerated and the amount of conducting material that can be inserted into the winding slots, a large percentage being insulating material.

According to the invention a linear induction motor comprises a cast, low voltage winding connected to the secondary winding of a transformer and located in slots in a core of the motor to extend from slot to slot in a zig-zag formation to substantially fill the slots, the parts of the winding outside the slots having a larger cross section than that of the winding parts in the slots to provide a large area for cooling purposes.

The invention will be described with reefrence to the accompanying drawings:—

Fig. 1 is a side elevation of a winding;

Fig. 2 is an underneath plan view of a winding thereof;

Fig. 3 is an end elevation to a larger scale looking in the direction of the arrow A Fig. 2;

Fig. 4 is a diagrammatic elevation of the winding showing the three phases;

Fig. 5 is a diagrammatic view showing the star connection of the winding.

The winding is formed of conductors 2, 3, 4, one for each phase of a three phase supply connected in star formation as shown in Fig. 5. Each conductor is cast into the slots 1 in a laminated core 5 without insulating material to obtain a substantially 100% conducting factor. The windings are preferably cast in situ but may be cast for insertion in the slots. Due to the casting process the shape of a conductor can change together with the cross section for convenience when crossing or passing other conductors.

Each conductor is not a conventional coil, but a solid conductor bar 2, 3, 4 arranged to zig-zag in and out of the slots 1.

The omission of the insulation is possible, due to the very low voltage used (1—10 volts), the resistivity of the laminated core being high compared to the conductor path.

The low voltage is obtained from a transformer which may be part of the motor assembly or separate therefrom.

Under the invention the winding has a capability of operating at very high temperature, due to the metal construction without insulation. The conductors 2, 3, 4 are cast with end windings having a larger cross-section than that of the winding parts in the slots to provide a larger area for cooling purposes.

The conductors 2, 3, 4 enter the laminated core from the star point D (Fig. 5) and at the end of the laminated core 5 are extended outwards and brazed at 6 to further conductors which return in a similar zig-zag form through the slots 1 to input terminals A, B, C.

The losses in the conductors 2, 3, 4 will be lower than for conventional windings, since not only is each winding slot substantially completely filled with conducting material to give a lower resistance, but the portion outside the slot may not only be increased in cross section over that of the winding parts in the slots but the shape is improved to give the largest reasonable surface area for cooling purposes i.e. a flat section rather than square.

Each phase of the motor winding is continuous and the necessity to make coil interconnection as on standard machines is removed.

A standard 'winding' on the motor for

many voltages and frequencies of supply may be provided and the bobbins on the transformer primary are all that are required to be changed.

The need to encapsulate or enclose the motor winding has been removed. The only encapsulation necessary is on the transformer primary bobbins.

The only 'winding' failure possible is the transformer primary bobbins, which are easy and cheap to repair.

A large thrust motor may be constructed at low cost or a long term rated motor may be provided at a cost and size of a conventional short term motor.

The windings may be for a three phase supply connected in star formation to a transformer secondary with one conductor per slot per pole per phase, the conductor for one phase passing through every third slot, with the intervening slots occupied by a conductor for the other two phases.

The slot windings are of cast or bar construction and form a single turn winding per pole for each phase, one end of each winding being connected to the secondary windings of the transformer. The primary windings of the transformer on bobbins are connected to the mains supply.

The windings may however be arranged for other phases and slots per pole and the mechanical construction, may be varied to accommodate other transformer and linear motor arrangements, including saturable reactor connections.

WHAT WE CLAIM IS:—

1. A linear induction motor comprising a cast, low voltage winding connected to the secondary winding of a transformer and located in slots in a core of the motor to extend from slot to slot in a zig-zag formation to substantially fill the slots, the parts of the winding outside the slots having a larger cross section than that of the winding parts in the slots to provide a large area for cooling purposes.

2. A linear motor as in Claim 1 in which the slots are formed in a laminated core and the winding has one conductor per slot per pole, per phase.

3. A linear motor as in Claim 2 for a three phase supply in which a conductor for one phase passes through every third slot with the intervening slots occupied by a conductor for the other two phases.

4. A linear motor substantially as described with reference to the accompanying drawings.

J. OWDEN O'BRIEN & SON,
Chartered Patent Agents,
Manchester, M2 4LQ.

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1329205 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

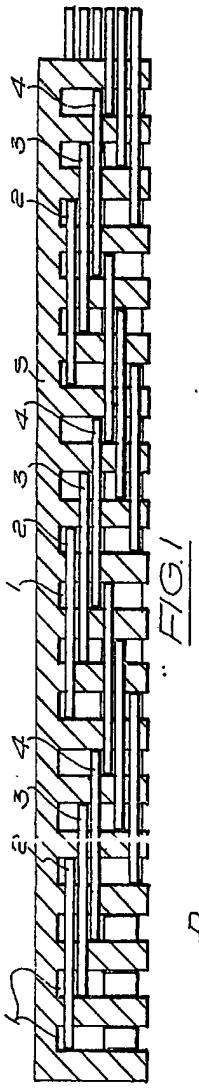

FIG. 1

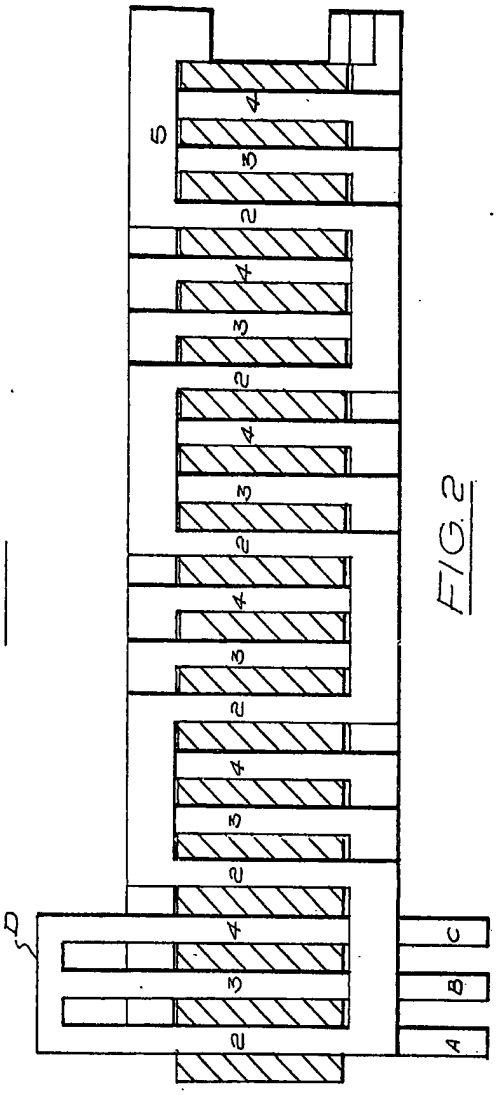

FIG. 2

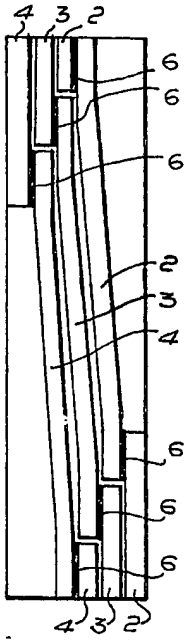

FIG.3

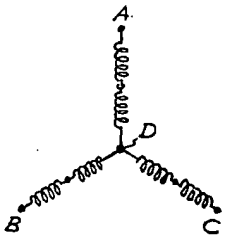

FIG.5

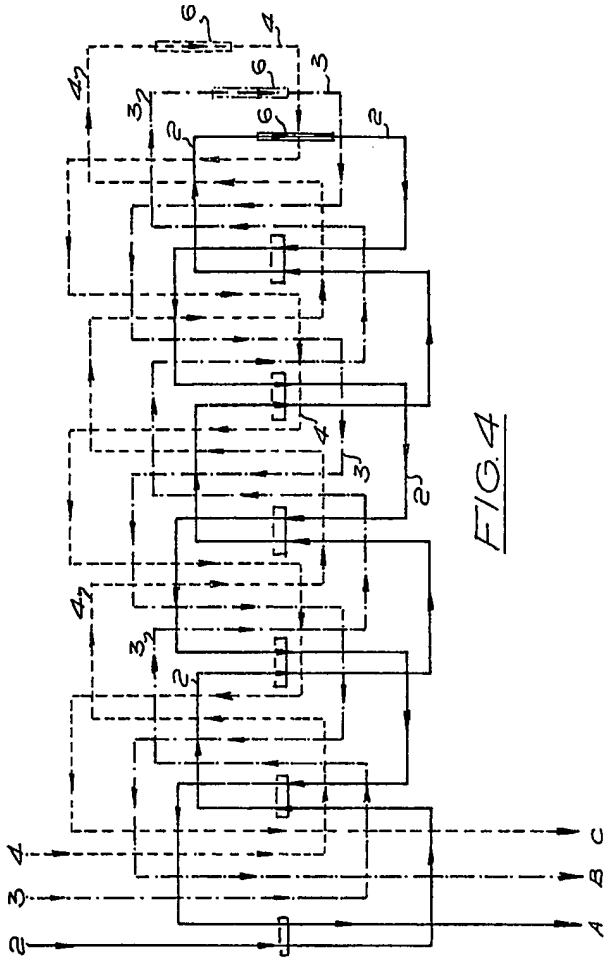

FIG.4